Serial No.: 10/616,232
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IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method of controlling ~~Ambient Electromagnetic Radiation Environments~~ an ambient electromagnetic radiation environment to improve ~~the~~ performance of a gas phase chemical ~~lasers~~ laser system comprising the steps of:

applying a mathematical model ~~POETRY Theory~~ to ~~the~~ energy transfer processes of a gas phase chemical laser system in order to determine ~~the~~ a specific dependency ~~dependencies~~ of each of ~~these~~ said processes upon the ambient electromagnetic radiation environment (AERE) and kinetic temperatures;

using said mathematical model ~~POETRY Theory~~ to determine ~~the~~ a plurality of spectral frequencies ~~frequency bands~~ that need to be controlled for each of said energy transfer ~~these kinetic~~ processes;

performing ~~the necessary~~ analytical calculations to ~~estimate~~ predict an effect ~~the effects~~ of moderating the AERE at ~~these~~ said plurality of spectral frequencies;

monitoring ~~these~~ said frequencies in subscale and scaled flow experiments to quantify the mathematical model ~~POETRY Theory~~ predictions and analytical calculations;

applying anti-reflective coatings, designed to reduce ~~the~~ a reflectivity of ~~the~~ undesired spectral ranges, to ~~the~~ surfaces surrounding ~~the~~ gas flow in said laser system to mitigate ~~for the purpose of mitigating~~ the AERE in ~~these frequencies~~ said undesired spectral ranges; and

providing radiation sources and reflective coatings to surfaces surrounding ~~the~~ a reaction chamber of said laser system to promote ~~those~~ kinetic processes that are beneficial to the ~~laser~~ performance of said gas phase chemical laser system.~~; and~~

~~monitoring the appropriate spectral frequencies in the AERE.~~

2. (Currently Amended) The method as set forth in claim 1, wherein the step of performing analytical calculations includes scaling calculations to determine threshold conditions and optimum flow configurations and conditions to control ~~the~~ radiation at ~~these~~ said frequencies.

3. (Currently Amended) The method as set forth in claim 2, wherein the radiation is controlled by adjusting at least one of shape, contour and temperature ~~the shapes, contours and~~

~~temperatures~~ of ~~the~~ a nozzle of said laser system and surrounding hardware.

4. (Currently Amended) The method as set forth in claim 1, wherein the step of applying coatings includes using dichroic optical isolators to isolate ~~the~~ flow component modules that are combined to construct a larger laser.

5. (Original) The method as set forth in claim 1, further comprising the step of reducing unobstructed free volume to improve performance.

6. (Currently Amended) The method as set forth in claim 5, wherein the step of reducing unobstructed free volume includes at least one of baffling, tortuous paths and contouring of laser system ~~the~~ surfaces to increase radiation loss.

7. (Currently Amended) The method as set forth in claim 1, further comprising the steps of constructing containment walls for a Singlet Oxygen Generator (SOG) of a material with a high emissivity (low reflectivity) in ~~the~~ a 4 - 12 micron spectral

region and cooling said walls to minimize ~~the~~ radiation in <u>said</u> ~~the~~ spectral region.

8. (Currently Amended) The method as set forth in claim 7, further comprising the step of improving the performance of a large volume supersonic COIL laser by using optical isolators to reduce and minimize the 4 - 12 micron radiation that is generated within ~~the~~ <u>a</u> laser cavity.

9. (Currently Amended) The method as set forth in claim 1, further comprising the steps of <u>improving performance of a supersonic HF/DF chemical laser with supersonic flow by</u> controlling the ambient electromagnetic environment (AERE) to minimize ~~the~~ H + HF deactivation reactions by using anti-reflecting coatings in <u>a</u> ~~the~~ 2-4 micron region of the infrared spectra on <u>a</u> ~~the~~ nozzle face <u>area</u> and containment walls of the supersonic flow, cooling of <u>said</u> ~~these~~ walls and operating the supersonic flow at or below 300 K ~~to improve performance of supersonic HF/DF chemical lasers~~.

10. (Currently Amended) The method as set forth in claim 9, wherein the step of operating the supersonic flow at or below 300

K is performed by operating a fluorine combustor at reduced plenum temperatures ~~(T ~ 1200K)~~ of approximately 1200K, and using a large expansion area nozzle to achieve hypersonic velocities and very low expansion temperatures of about 100K ~~(T~ 100 K)~~ of ~~the primary~~ a main flow.

11. (Original) The method as set forth in claim 10, wherein hydrogen or deuterium is pre-cooled to liquid nitrogen temperatures and injected parallel to the main flow so as to minimize flow stagnation effects.

12. (Currently Amended) The method as set forth in claim 1, further comprising the step of using optical coatings to mitigate the AERE in ~~the~~ a 5.2 micron region of the infrared spectrum to improve the performance of a supersonic azide based chemical laser based upon ~~the~~ a NCl(a) + I - NCl(X) + I* process.

13. (Currently Amended) The method as set forth in claim 1, further comprising the step of using optical coatings and radiation sources to enhance the AERE in ~~the~~ a 5.2 micron region of the infrared spectrum to improve the performance of a

supersonic visible red chemical laser based upon ~~the~~ a NCl(b-X) transition.

14. (Currently Amended) The method as set forth in claim 1, using ~~the~~ a family of electronic transition lasers based upon the stimulated emission process, $NF(a) + X + h\nu \rightarrow NF(x) + X^* + 2h\nu$ where X = HF, DX, CO, NO and other diatomic molecules with large dipole transition radiative cross-sections.

15. (New) The method as set forth in claim 1, wherein the mathematical model is based on a purely optical electronic transfer reaction yields theory.

16. (New) A method of controlling an ambient electromagnetic radiation environment to improve performance of a gas phase chemical laser system comprising the steps of:

applying a mathematical model to energy transfer processes of a gas phase chemical laser system in order to determine a specific dependency of each of said processes upon the ambient electromagnetic radiation environment (AERE) and kinetic temperatures;

using said mathematical model to determine a plurality of spectral frequencies that need to be controlled for each of said energy transfer processes;

performing analytical calculations to predict an effect of moderating the AERE at said plurality of spectral frequencies;

monitoring said frequencies in subscale and scaled flow experiments to quantify the mathematical model predictions and analytical calculations;

reducing, based on said mathematical model predictions and analytical calculations, a reflectivity of undesired spectral ranges in surfaces of said laser system surrounding gas flow to mitigate the AERE in said undesired ranges; and

increasing, based on said mathematical model predictions and analytical calculations, a reflectivity of desired spectral ranges in surfaces surrounding a reaction chamber of said laser system to to promote kinetic processes that are beneficial to the performance of said gas phase chemical laser system.

17. (New) The method as set forth in claim 16, wherein said step of increasing reflectivity includes providing radiation

sources and applying reflective coatings to said reaction chamber surfaces.

18. (New) The method as set forth in claim 16, wherein said step of decreasing reflectivity includes applying anti-reflective coatings to said laser system gas flow surfaces.